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CHAPTER RESOURCES



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Ecological Succession

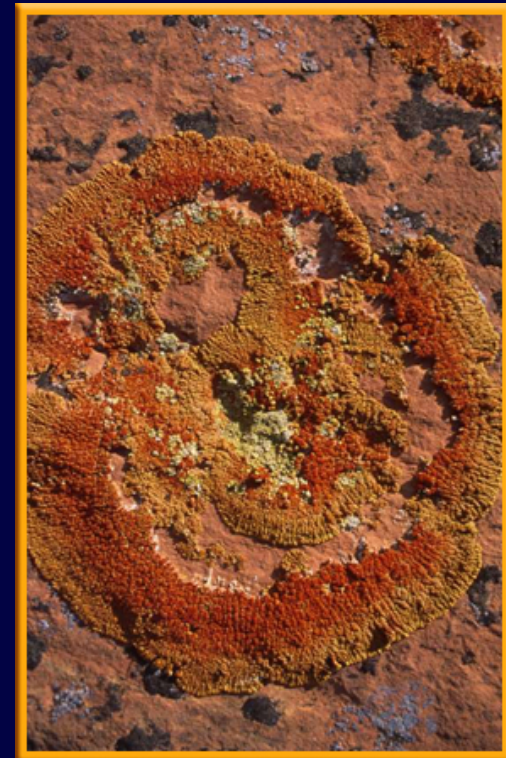
- **Succession** refers to the normal, gradual changes that occur in the type of species that live in an area. 
- Succession occurs differently in different places around the world.



1

Primary Succession

- The process of succession that begins in a place previously without plants is called primary succession.
- It starts with the arrival of living things such as lichens (LI kunz).
- These living things, called **pioneer species**, are the first to inhabit an area. 🔊



1

New Soil

- During primary succession, soil begins to form as lichens and the forces of weather and erosion help break down rocks into smaller pieces.
- When the lichens die, they decay, adding small amounts of organic matter to the rock.
- Plants such as mosses and ferns grow in this new soil.



1

New Soil

- The soil layer thickens, and grasses, wildflowers, and other plants begin to take over.
- When these plants die, they add more nutrients to the soil.
- This buildup is enough to support the growth of shrubs and trees.



1

Secondary Succession

- After a forest fire, not much seems to be left except dead trees and ash-covered soil.
- All that remains is bare soil. However, it does not remain lifeless for long.
- The soil already contains the seeds of weeds, grasses, and trees.



1


Secondary Succession

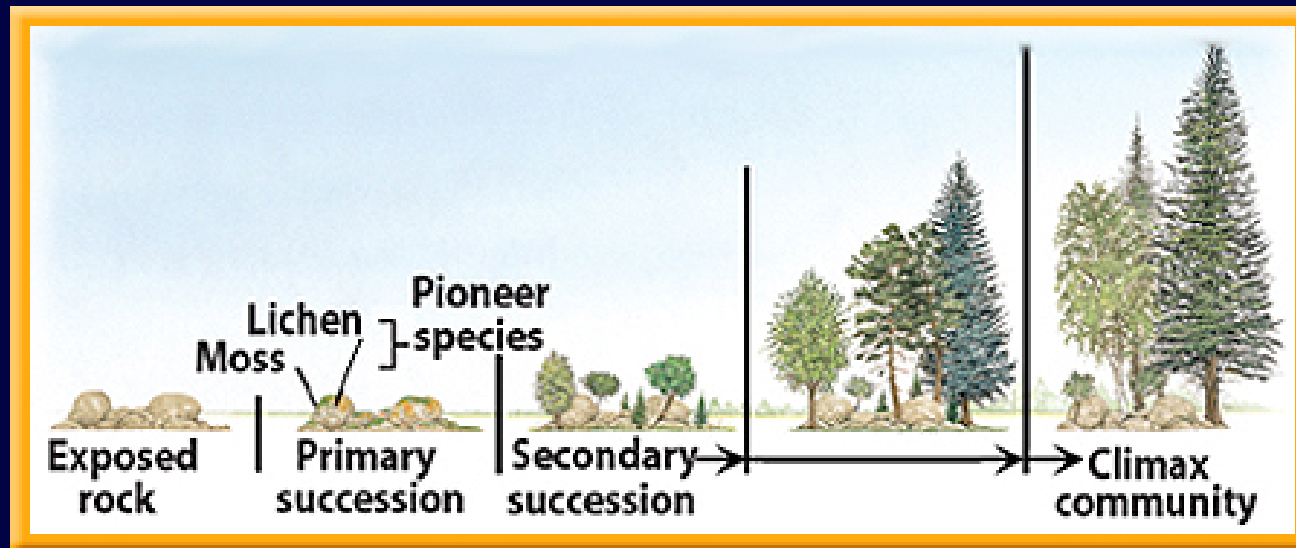
- Succession that begins in a place that already has soil and was once the home of living organisms is called secondary succession.
- Because soil already is present, secondary succession occurs faster and has different pioneer species than primary succession does.



1

Climax Communities

- A community of plants that is relatively stable and undisturbed and has reached an end stage of succession is called a **climax community**. 



1

Climax Communities

- There are fewer changes of species in a climax community over time, as long as the community isn't disturbed by wildfire, avalanche, or human activities.



1

Question 1

Which is a pioneer species?

- A. ash tree
- B. fungi
- C. lichen
- D. zebra



Section Check

1

Answer

The correct answer is C. Lichens often are the first to inhabit an area that previously has had no plants.



CHAPTER RESOURCES



1

Question 2

Explain primary succession.

Answer

Primary succession begins in a place that previously has had no plants. Often, primary succession begins on new land composed of rock.



1

Question 3

A community of plants that is relatively stable and undisturbed has reached an end stage of succession and is known as a _____.

- A. climax community
- B. final community
- C. primary community
- D. secondary community



Section Check

1

Answer

The answer is A. A climax community forms over many years. There are fewer changes of species in a climax community over time.



CHAPTER RESOURCES



2


Factors That Affect Biomes

- Even widely separated regions of the world can have similar biomes because they have similar climates.
- Climate is the average weather pattern in an area over a long period of time.
- The two most important climatic factors that affect life in an area are temperature and precipitation.



2

Major Biomes

- Large geographic areas that have similar climates and ecosystems are called **biomes** (BI ohmz). 
- There are seven common types of land biomes.

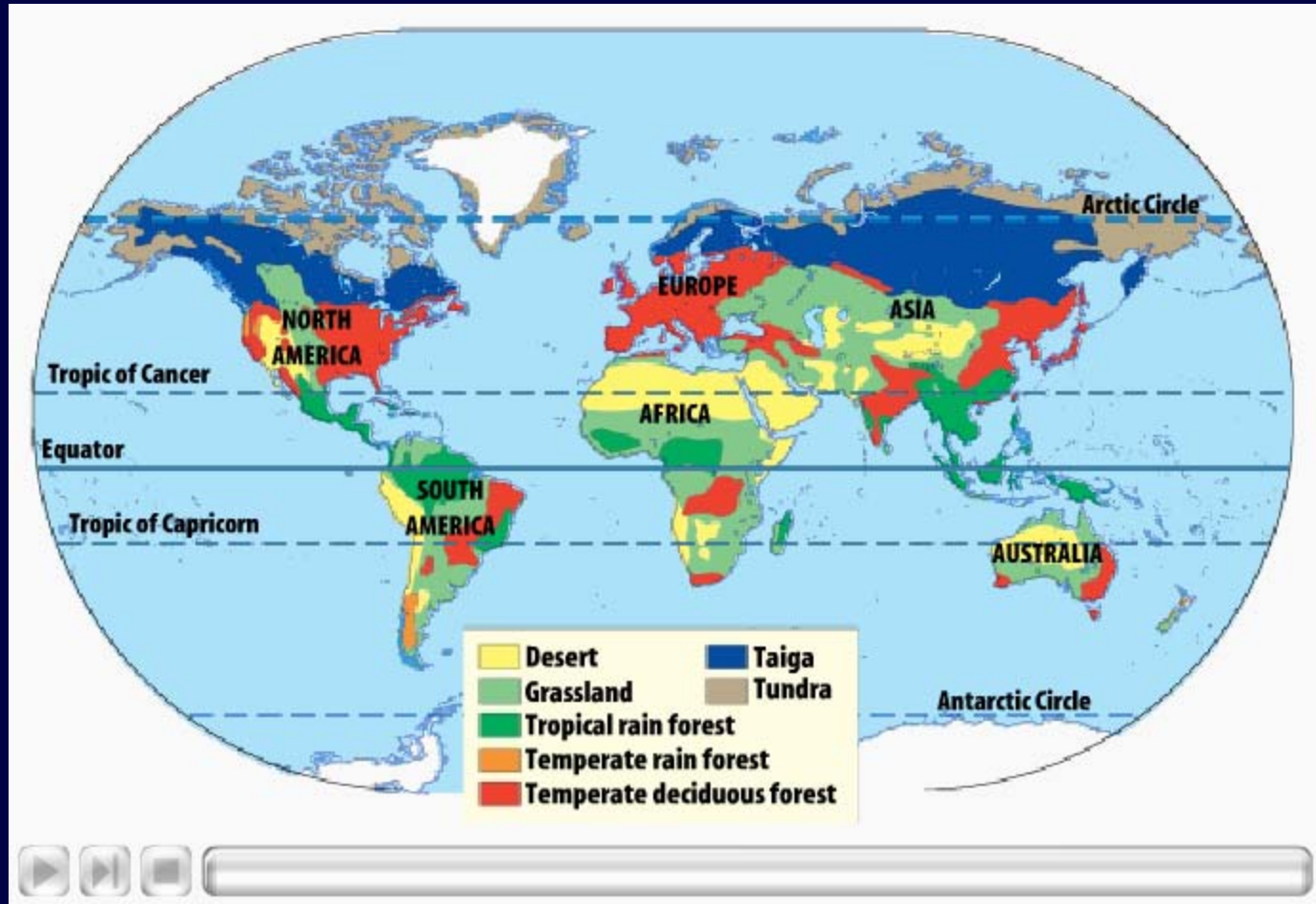


Biomes

2

Major Biomes

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END

2


Major Biomes

- Tropical rain forests are climax communities found near the equator, where temperatures are warm and rainfall is plentiful.
- Coniferous forests grow where winter temperatures are cold and rainfall is moderate.



2

Tundra

- The **tundra** is a cold, dry, treeless region, sometimes called a cold desert. 
- Precipitation averages less than 25 cm per year.



- Winters in the Arctic can be six to nine months long.



2

Tundra

- The average daily temperature is about -12°C .
- Only the top portion of soil thaws in the summer.
- Below the thawed surface is a layer of permanently frozen soil called permafrost.



2

Tundra

- Alpine tundra, found above the treeline on high mountains, have similar climates.
- Tundra soil has few nutrients because the cold temperatures slow the process of decomposition.



2

Tundra Life

- Tundra plants include mosses, grasses, and small shrubs.
- Many lichens grow on the tundra.
- During the summer, mosquitoes, blackflies, and other biting insects fill the air.



2

Tundra Life

- Migratory birds such as ducks, geese, shorebirds, and songbirds nest on the Arctic tundra during the summer.
- Mice, voles, lemmings, arctic hares, caribou, reindeer, and musk oxen also are found there.



2


Tundra Life

- People are concerned about overgrazing by animals on the tundra.
- Because the growing season is so short, plants and other vegetation can take decades to recover from damage.



2

Taiga

- The **taiga** (TI guh) is a cold, forest region dominated by cone-bearing evergreen trees. 



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END

2

Taiga

- Precipitation is mostly snow and averages 35 cm to 100 cm each year.
- Most soils of the taiga thaw completely during the summer, making it possible for trees to grow.



2

Taiga

- Little sunlight penetrates the trees to reach the forest floor. However, some lichens and mosses do grow on the forest floor.
- Moose, lynx, shrews, bears, and foxes are some of the animals that live in the taiga.



2

Temperate Deciduous Forest

- Temperate regions usually have four distinct seasons each year.
- Annual precipitation ranges from about 75 cm to 150 cm and is distributed throughout the year.
- Temperatures range from below freezing during the winter to 30°C or more during the warmest days of summer.



2

Temperate Forest Life

- Most of the temperate forests in Europe and North America are dominated by climax communities of deciduous trees, which lose their leaves every autumn.




- These forests are called **temperate deciduous forests**. 



2

Temperate Rain Forest

- New Zealand, southern Chile, and the Pacific Northwest of the United States are some of the places where **temperate rain forests** are found. 
- The average temperature of a temperate rain forest ranges from 9°C to 12°C.



2

Temperate Rain Forest

- Precipitation ranges from 200 cm to 400 cm per year.
- Trees with needlelike leaves dominate these forests.
- Many grow to great heights.



2

Temperate Rain Forest

- Animals of the temperate rain forest include the black bear, cougar, bobcat, northern spotted owl, and marbled murrelet.
- Many species of amphibians also inhabit the temperate rain forest, including salamanders.



2


Temperate Rain Forest

- Many logging companies now are required to replant trees to replace the ones they cut down.
- Also, some rain forest areas are protected as national parks and forests.



2

Tropical Rain Forest

- Warm temperatures, wet weather, and lush plant growth are found in **tropical rain forests**. 
- The average temperature, about 25°C, doesn't vary much between night and day.



2

Tropical Rain Forest

- Most tropical rain forests receive at least 200 cm of rain annually.
- Some receive as much as 600 cm of rain each year.
- Tropical rain forests are one of the most biologically diverse places in the world.



2

Tropical Rain Forest Life

- Scientists divide the rain forest into zones based on the types of plants and animals that live there, just as a library separates books about different topics onto separate shelves.
- The zones include: forest floor, understory, canopy, and emergents.



2

Tropical Rain Forest Life

Emergents



Canopy



Understory



Forest Floor



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END

2

Tropical Rain Forest Life

- Although tropical rain forests support a huge variety of organisms, the soil of the rain forest contains few nutrients.
- Over the years, nutrients have been washed out of the soil by rain.
- On the forest floor, decomposers immediately break down organic matter, making nutrients available to the plants again.



2

Human Impact

- Farmers that live in tropical areas clear the land to farm and to sell the valuable wood. After a few years, the crops use up the nutrients in the soil, and the farmers must clear more land.
- As a result, tropical rain forest habitats are being destroyed.



2


Human Impact

- In some areas, logging is prohibited.
- In other areas, farmers are taught new methods of farming so they do not have to clear rain forest lands continually.



2

Desert

- The driest biome on Earth is the **desert**. 
- Deserts receive less than 25 cm of rain each year and support little plant life.
- Some desert areas receive no rain for years.



2

Desert

- Most deserts are covered with a thin, sandy, or gravelly soil that contains little organic matter.
- Desert plants are spaced far apart and much of the ground is bare.



2

Desert Life

- Most desert plants are able to store water.
- Cactus plants are probably the most familiar desert plants of the western hemisphere.



2

Desert Life

- Desert animals also have adaptations that help them survive the extreme conditions.



2

Desert Life

- Most animals are active only during the night, late afternoon, or early morning when temperatures are less extreme.
- Few large animals are found in the desert.



2


Desert Life

- Education about desert environments has led to an awareness of the impact of human activities.
- As a result, large areas of desert have been set aside as national parks and wilderness areas to protect desert habitats.



2

Grasslands

- Temperate and tropical regions that receive between 25 cm and 75 cm of precipitation each year and are dominated by climax communities of grasses are called **grasslands**. 



2

Grasslands

- Most grasslands have a dry season, when little or no rain falls.
- This lack of moisture prevents the development of forests.



2

Grasslands Life

- Kangaroos graze in the grasslands of Australia.
- In Africa, communities of animals such as wildebeests, impalas, and zebras thrive in the savannas.



2

Grasslands Life

- Grasslands are perfect for growing many crops such as wheat, rye, oats, barley, and corn.
- Grasslands also are used to raise cattle and sheep.
- Most farmers and ranchers take precautions to prevent the loss of valuable habitats and soil.



2

Question 1

Which do you live in if the average temperature is between 9°C and 12°C and precipitation ranges from 200 cm to 400 cm per year?

- A. desert
- B. temperate deciduous forest
- C. temperate rain forest
- D. tundra



2

Answer

The correct answer is C. Many species of amphibians inhabit the temperate rain forest, including salamanders.



Section Check

2

Question 2

Where would you most likely see this animal?



CHAPTER RESOURCES



END

Section Check

2



A. desert
B. taiga

C. temperate rain forest
D. tundra



CHAPTER RESOURCES



END

2

Answer

The answer is D. Mice, voles, lemmings, arctic hares, caribou, reindeer, and musk oxen are some of the animals that live on the tundra.



2

Question 3

When rivers and streams are diverted to provide water for desert cities, what happens to the wildlife?

- A. it dies
- B. it leaves the area
- C. it tends to move closer to the cities
- D. it becomes extinct



2

Answer

The answer is C. Large areas of desert have been set aside as national parks and wilderness areas to protect desert habitats and prevent animals from moving closer to cities.



Freshwater Ecosystems

- In aquatic environments, water temperature, the amount of sunlight present, and the amounts of dissolved oxygen and salt in the water are important.



3

Rivers and Streams

- Flowing freshwater environments vary from small, gurgling brooks to large, slow-moving rivers.
- Naturally fast-flowing streams usually have clearer water and higher oxygen content than slow-flowing streams.



3

Rivers and Streams

- Most nutrients that support life in flowing-water ecosystems are washed into the water from land.
- In areas where the water movement slows, such as in the pools of streams or in large rivers, debris settles to the bottom.
- These environments tend to have higher nutrient levels and more plant growth.



3

Human Impact

- Once regarded as a free place to dump sewage and other pollutants, many people now recognize the damage this causes.
- Treating sewage and restricting pollutants have led to an improvement in the water quality in some rivers.



3

Lakes and Ponds

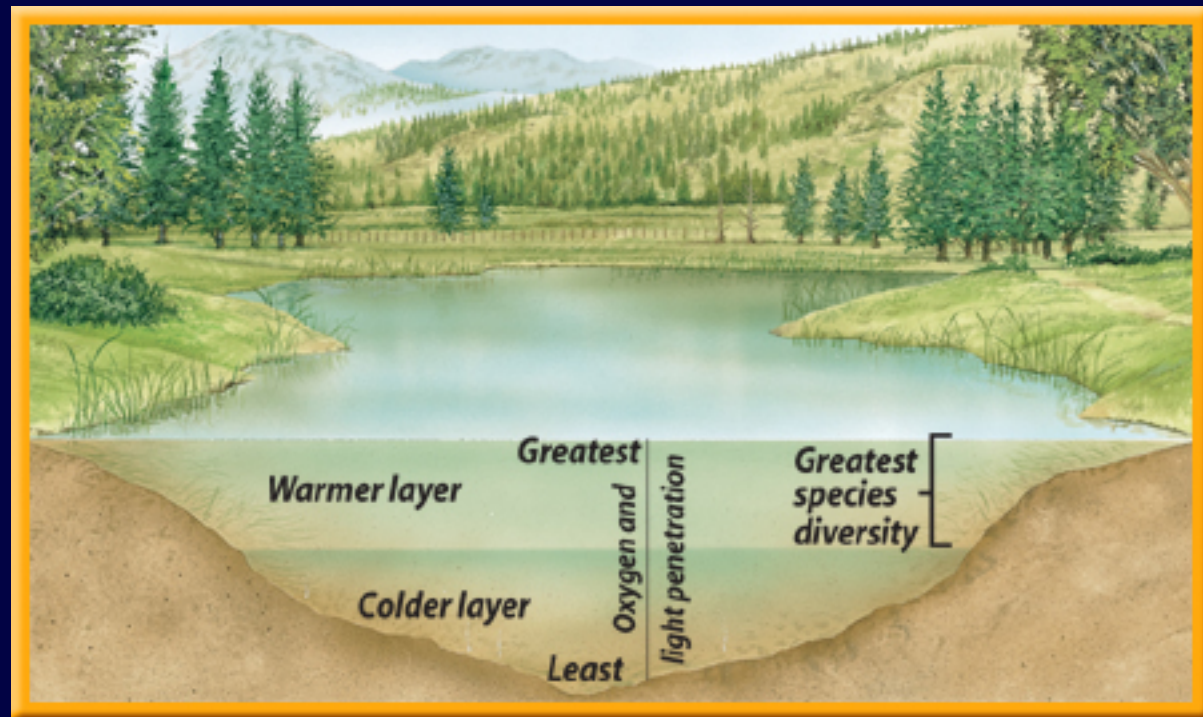
- When a low place in the land fills with rainwater, snowmelt, or water from an overflowing stream, a lake or pond might form.
- Pond or lake water hardly moves. It contains more plants than flowing-water environments contain.



3

Lakes and Ponds

- Lakes are larger and deeper than ponds.
- They have more open water because most plant growth is limited to shallow areas along the shoreline.



3

Lakes and Ponds

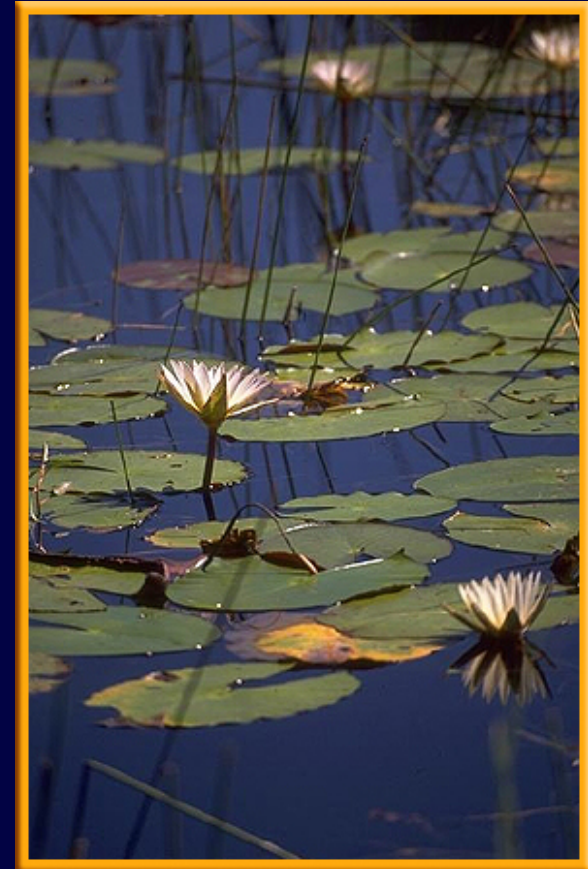
- Colder temperatures and lower light levels limit the types of organisms that can live in deep lake waters.
- Floating in the warm, sunlit waters near the surface of freshwater lakes and ponds are microscopic algae, plants, and other organisms known as plankton.



3

Lakes and Ponds

- A pond is a small, shallow body of water.
- Because ponds are shallow, they are filled with animal and plant life.
- The warm, sunlit water promotes the growth of plants and algae.
- Because of the lush growth in pond environments, they tend to be high in nutrients.



3

Water Pollution

- Fertilizer-filled runoff from farms and lawns, as well as sewage dumped into the water, can lead to excessive growth of algae and plants in lakes and ponds.
- The growth and decay of these organisms reduces the oxygen level in the water, which makes it difficult for some organisms to survive.



3

Water Pollution

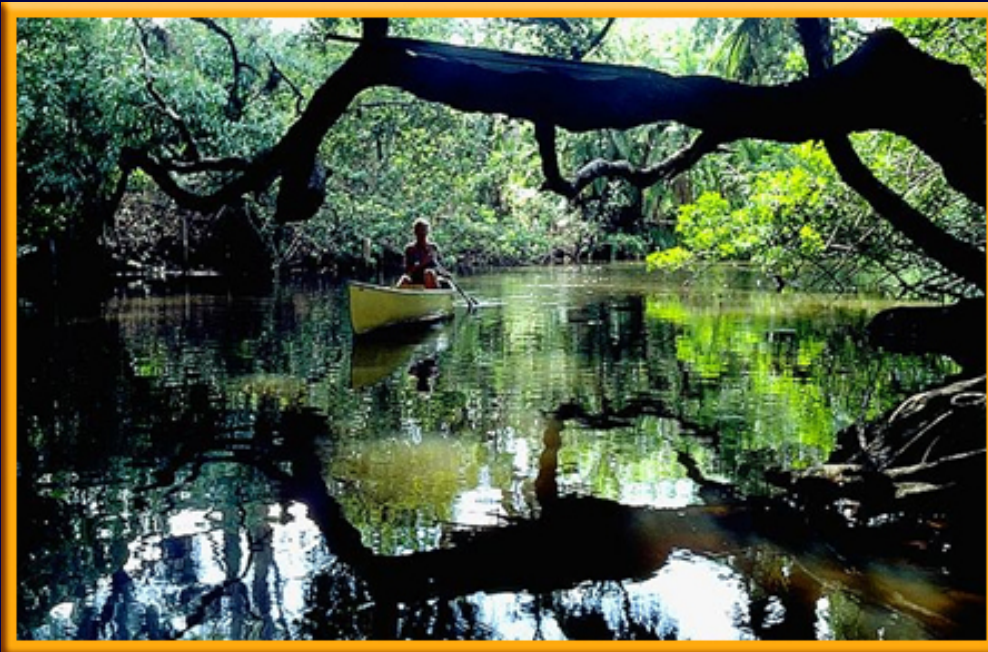
- People are being educated about problems associated with polluting lakes and ponds.
- Fines and penalties are issued to people caught polluting waterways.



3

Wetlands

- **Wetlands** are regions that are wet for all or most of a year. 
- They are found in regions that lie between



landmasses
and water.

- Other names for wetlands include swamps, bogs, and fens.



3

Wetlands

- They are fertile ecosystems, but only plants that are adapted to waterlogged soil survive there.
- Wetland animals include beavers, muskrats, alligators, and the endangered bog turtle.



3

Wetlands

- Only recently have people begun to understand the importance of wetlands.
- Products that come from wetlands, including fish, shellfish, cranberries, and plants, are valuable resources.
- Now many developers are restoring wetlands, and in most states access to land through wetlands is prohibited.



3

Saltwater Ecosystems

- About 95 percent of the water on the surface of Earth contains high concentrations of various salts.
- Saltwater ecosystems include oceans, seas, a few inland lakes such as the Great Salt Lake in Utah, coastal inlets, and estuaries.



3

Open Oceans

- Scientists divide the ocean into different life zones, based on the depth to which sunlight penetrates the water.
- The lighted zone of the ocean is the upper 200 m or so.



3


Open Oceans

- Below about 200 m is the dark zone of the ocean.
- Animals living in this region feed on material that floats down from the lighted zone, or they feed on each other.



3

Coral Reefs

- **Coral reefs** are formed over long periods of time from the calcium carbonate shells secreted by animals called corals. 



- When corals die, their shells remain.
- Over time, the shell deposits form reefs.



3


Coral Reefs

- Reefs do not adapt well to long-term stress.
- Runoff from fields, sewage, and increased sedimentation from cleared land harm reef ecosystems.



3

Seashores

- The shallow waters along the world's coastlines contain a variety of saltwater ecosystems, all of which are influenced by the tides and by the action of waves.
- The **intertidal zone** is the portion of the shoreline that is covered with water at high tide and exposed to the air during low tide. 



3


Seashores

- Organisms that live in the intertidal zone must be adapted to dramatic changes in temperature, moisture, and salinity and must be able to withstand the force of wave action.



3

Estuaries

- The area where a river meets an ocean and contains a mixture of freshwater and salt water is called an **estuary** (ES chuh wer ee). 
- Other names for estuaries include bays, lagoons, harbors, inlets, and sounds.



3

Estuaries

- Salinity in estuaries changes with the amount of freshwater brought in by rivers and streams, and with the amount of salt water pushed inland by the ocean tides.
- Estuaries are extremely fertile, productive environments because freshwater streams bring in tons of nutrients washed from inland soils.



3

Estuary Life

- Organisms found in estuaries include many species of algae, salt-tolerant grasses, shrimp, crabs, clams, oysters, snails, worms, and fish.



- Estuaries also serve as important nurseries for many species of ocean fish.



3

Question 1

Which is NOT a type of wetland?

- A. bay
- B. bog
- C. fen
- D. swamp



3

Answer

The answer is A. Wetlands are regions that lie between landmasses and water. They are wet for all or most of the year.



3

Question 2

Explain why ponds contain more vegetation than lakes contain.

Answer

Ponds are shallower than lakes. Because ponds are shallow, they are filled with animal and plant life. The warm, sunlit water promotes the growth of plants and algae. Fewer organisms live in the deeper water of lakes.



3

Question 3

The area where a river meets an ocean and contains a mixture of freshwater and salt water is called a(n) _____.

- A. bog
- B. estuary
- C. fen
- D. intertidal zone



Section Check

3

Answer

The answer is B. The Chesapeake Bay is an example of an estuary.



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